United States Department of the Interior
Fish and Wildlife Service

Fishery Leaflet 56

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PACIFIC OCEANIC FISHERY
INVESTIGATIONS

Chicago 54, Ill. * April 1944

FISH DISTRIBUTION BOAT[1/]

By Roy D. Noble, Division of Fish Culture; C. H. Bennett, Division of Lands

To provide fish for the angler's creel and maintain the supply despite the ever increasing number of fishermen on numerous lakes, streams, and large impoundments, new stock from fish cultural stations must be planted so as to obtain the greatest possible survival of young fish. For a number of years past, the fishes planted in our lakes and impoundments were usually delivered in pails or by railroad car to applicants who transported them to the nearest and most accessible points along the shore where the fish were more or less dumped into the water. Later, when tank trucks were used, the truck frequently could not be brought close enough for the fish to be planted at many points in large bodies of water. In many instances, the food supply was probably insufficient to support large local populations of planted fish, and cover was not sufficient to give protection to them.

If fish are to be distributed to large lakes and impoundments from motor vehicles which can reach only the places where roadways are close to the body of water, there is little opportunity to spread the planted fish so as to give them access to cover and food sufficient for satisfactory adjustment and growth. For some time it has been evident that properly designed boats would provide a better means for the distribution of fish in large bodies of water. A fish distribution boat has recently been designed at the Fish and Wildlife Service's Burnet, Texas, Fish Cultural Station, which is proving to be of great value in planting fish widely in large impoundments.

CONSTRUCTION

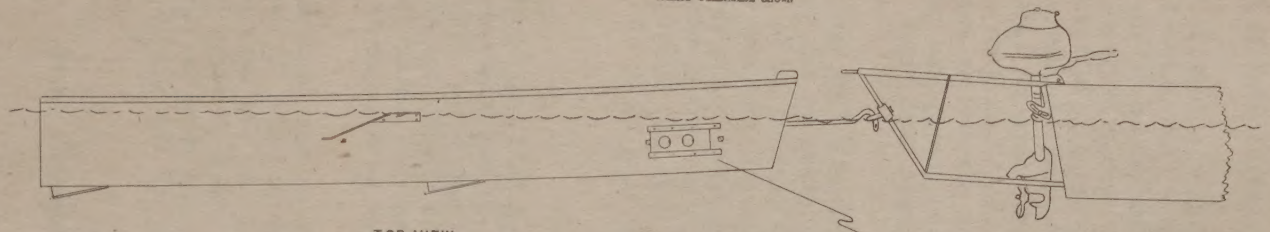
A fish distribution boat is constructed to float through built-in bouyancy attained either by the use of lighter-than-water lumber or by the addition of sealed air chambers that give it at least three inches of freeboard. Such construction is necessary because the openings provided for the intake and exhaust of water prevent dependence for bouyancy on the usual sealed hull water displacement principle. The accompanying drawings are provided as a guide in building the boat.

The type of construction outlined in figure 1 and known as the "alternate intake vent" is recommended for boats weighing more than 60 pounds. It makes possible a water-tight seal, permitting the boat to be used for ordinary purposes and renders towing easier when the boat is not being used to carry fish. However, with either of the types of construction outlined and when the total weight does not exceed 100 pounds, the boat is self-bailing if the bow is held high in towing at speeds of 6 miles an hour or more.

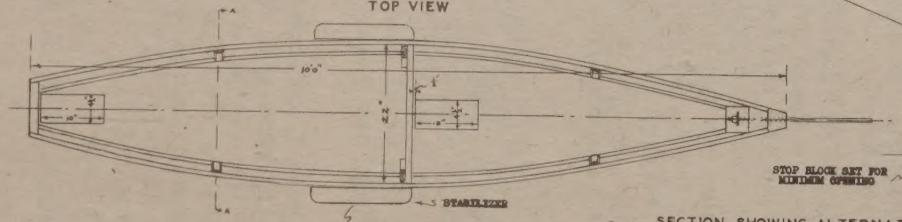
1/ Designed by Roy D. Noble, foreman; drawings by C. H. Bennett, land valuation engineer.

FISH DISTRIBUTION BOAT

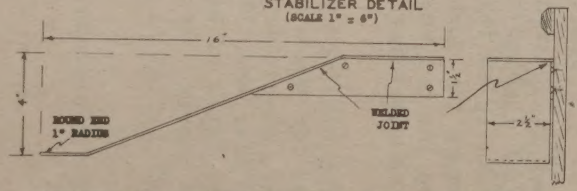
SCALE 1" = 2'
UNLESS OTHERWISE SHOWN



TOP VIEW



STABILIZER DETAIL
(SCALE 1" = 6")



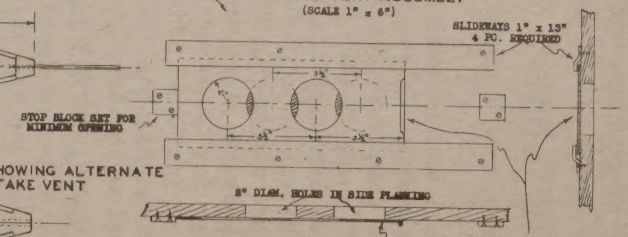
TO MINIMIZE "ROLLING" 2 STABILIZER FINS OR FOILS HAVE BEEN ADDED, AS SHOWN. THEY SHOULD BE PLACED AMIDSHIP AND EXTEND ABAFT THIS POINT (ASTERN) FOR ENGAGING THE WATER WITH INCREASING FORCE AS THE ROLL INCREASES; ABOUT A 30 DEGREE ANGLE FROM HORIZONTAL. AN EXCELLENT MATERIAL FOR THIS IS SPRING BRASS OR ALUMINUM ALLOY SUCH AS IS USED IN PLANE" CONSTRUCTION.

THE STABILIZERS SHOULD BARELY ENGAGE THE WATER AT NORMAL FLOATING WATER LINE WITH THE FISH DISTRIBUTION BOAT AT REST.

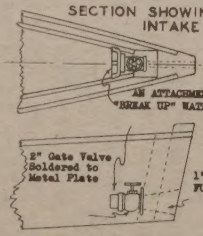
AS THIS POINT IS ONLY TO BE DETERMINED WITH BUOYANCY FACTORS OF EACH INDIVIDUAL BOAT, AFTER ALL OTHER FITTINGS AND HARDWARE ARE IN PLACE, THE FOILS SHOULD BE ADDED LAST.

ROLLING IS CAUSED BY WAVE ACTION AS WELL AS IN MAKING A CHANGE OF DIRECTION IN THE NORMAL COURSE OF OPERATIONS.

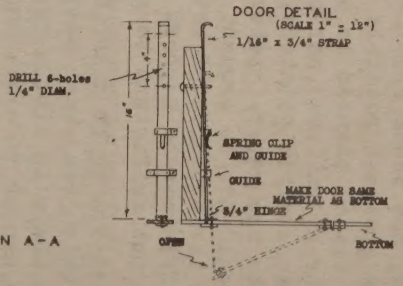
INTAKE VENT ASSEMBLY
(SCALE 1" = 6")


SLIDEWAYS 1" x 13"
4 PC. REQUIRED
STOP BLOCK SET FOR MINIMUM OPENING
2" DIAM. HOLES IN SIDE PLANKING
SLIDE VENT COVER 2½" x 9"
2 PIECES REQUIRED
USE 20 GA. METAL, NON RUSTING MATERIAL

SECTION SHOWING ALTERNATE INTAKE VENT

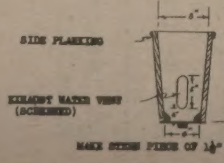

AN ATTACHMENT TO VALVE TO "BREAK UP" WATER FLOW IS REQUIRED
2" Gate Valve Soldered to Metal Plate
1" x 4" VENT CUT IN BOW STEM FUNNELING TO MEET VALVE

DOOR DETAIL
(SCALE 1" = 12")

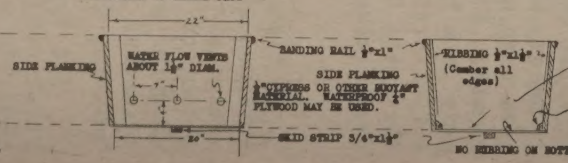


SECTON A-A

STERN SECTION



CENTER SECTION
ESSENTIAL TO RETARD FLOW



RECOMMEND ¾" WATERPROOF PLYWOOD FOR BOTTOM; MASONITE PRESTWOOD 2nd CHOICE.

USE "RACK BAND" NAIL STRIP 1½" x 1"

SPEED OF BOAT PLUS PROPELLER WAKE MAKES BOAT SELF-BAILING AT 6 MILES PER HOUR OR LESS.

ALL METAL HARDWARE SHOULD BE OF ALUMINUM OR OTHER LIGHT WEIGHT NON-RUSTING MATERIAL IF POSSIBLE.

BOW STEM SHOULD BE OF 6"x½" STOCK WITH ABOUT 5½" SLANT WITH THE VERTICAL. THIS WILL BRING SIDE PLANKING TO BOW IN NATURAL CURVE.

IN THE HORIZONTAL PLANE, THE BOTTOM SHOULD NOT DEVIATE MORE THAN ONE INCH BETWEEN MIDDLE AND ENDS.

ALL VENTS SHOULD BE SCREENED WITH THE EXCEPTION OF THE BOTTOM OPENINGS WHICH ARE FITTED WITH DOORS FOR THE RELEASING OF FISH.

BOAT BUILT OF "SOFT WOODS" WITH THE EXCEPTION OF BOTTOM. SEALED BUOYANCY CHAMBERS ARE NOT REQUIRED IF BOAT IS REMOVED FROM WATER WHEN NOT IN USE.

BASIC FORMULA PROVIDES ONE CUBIC FOOT OF WATER FOR 10 POUNDS OF NO. 2 FINGERLING FISH AT NORMAL WATER TEMPERATURES, -80 degrees F. MAX. MODEL ILLUSTRATED PROVIDES ABOUT 9 cu.ft. OF WATER.

Designed by ROY D. NOBLE
Drawn by CARNY H. BENNETT

WATER CIRCULATION

Circulation of the water is attained by means of intake and exhaust vents. These provide for several distinct requirements in the operation of the boat. They admit sufficient water when fully opened to prevent suffocation of the fish when the boat is not in motion. They provide a flow of water that escapes through the hinged release doors in the bottom of the boat, thereby automatically discharging the fish. They further permit an adjustable current of water through the boat when it is being towed.

The slide intake vent is recommended only when the total weight of the boat can be kept below 50 pounds. This can be done by using 1/2-inch side planking and a pressed wood bottom, keeping within the dimensions suggested. This type of boat is suitable for speeds not in excess of 10 miles per hour.

TOWING

Under working conditions, it has been determined that a bracket attachment fitted to the stern of the towing boat permitting hitching at varying heights to control the depth of the water in the boat from zero to ten inches, makes the device easily manageable. Figure 2 illustrates a hitching bracket for a boat driven by an outboard motor. The distribution boat must be kept close-hauled at all times when being towed.

CARRYING CAPACITY

The boat shown holds about nine cubic feet of water and has a fish-carrying capacity for varying sizes of warm-water fish as listed below:

Fry	35 lbs.
Fingerling #1 . . .	55 lbs.
Fingerling #2 . . .	90 lbs.
Fingerling #3 . . .	110 lbs.

These loads may be carried when the water temperature is approximately 80° F. Fish in the quantities specified may be carried for several hours without loss. Higher water temperature requires some reduction in the load.

RELEASING THE FISH

Two doors are provided in the bottom of the boat, through which the fish are released, the rate of discharge being controlled both by adjustment of the vents and of the release doors. These doors must have a positive and rigid locking adjustment as considerable pressure against them is exerted by the forward motion of the boat. They must resist also a suction effect from the slip stream of the boat.

The boat should not be allowed to remain out of motion for more than a few minutes when loaded near capacity with fish. Usually, the most dangerous time is that of loading the towing boat and getting it under way. That promptly accomplished, the intake vents should be adjusted to permit an even, smooth flow of water through the boat, care being taken to avoid boiling or churning. Upon reaching the section to be planted, the fish distribution boat is brought alongside the towing boat and the fish release door (or doors) are opened to the desired degree and the boat is towed over the planting area. The fish being released automatically, the density of the plant is regulated by adjustment of the doors and vents.

HITCHING BRACKET

FOR MOST MOTORS AND BOATS THE DIMENSIONS SHOWN SHOULD PROVE SATISFACTORY, BUT CAN BE CHANGED TO FIT ANY UNUSUAL SIZES OF EQUIPMENT. THE SLIDING HITCH AND ADJUSTABLE LOWER STRAP SHOULD PROVIDE WIDE LATITUDE OF POSITIONS AND CAN BE ARRANGED TO GIVE BEST RESULTS FOR THE PARTICULAR EQUIPMENT USED. THE FIXED TOWING RING WELDED TO THE TOP OF THE MAIN FRAME WILL PROVE USEFUL WHEN THE FISH DISTRIBUTION BOAT IS TOWED EMPTY.

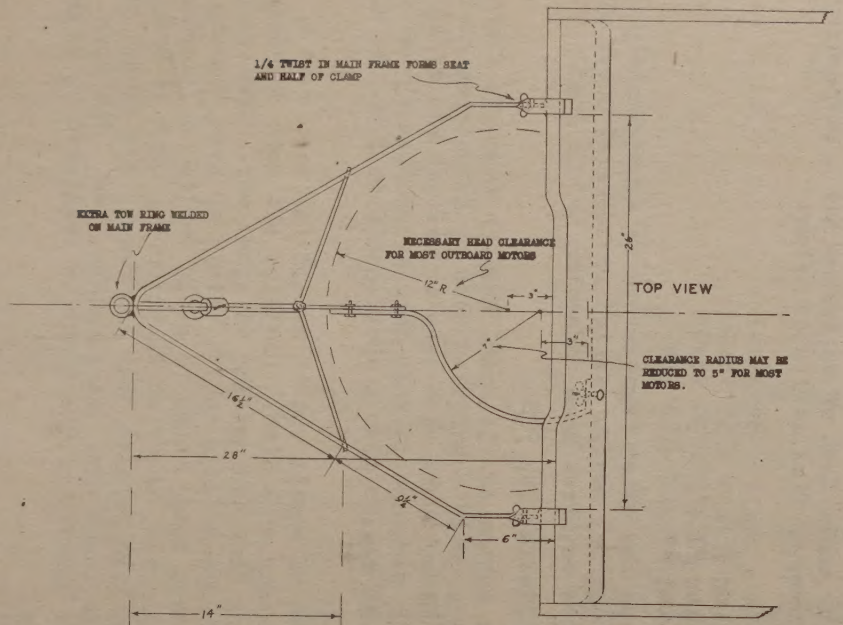
NOTE PROVISIONS FOR CLEARANCE FOR OUTBOARD MOTOR. CHECK WITH YOUR EQUIPMENT FOR SUFFICIENCY WITH RESPECT TO MOTOR HEAD SWING, ETC.

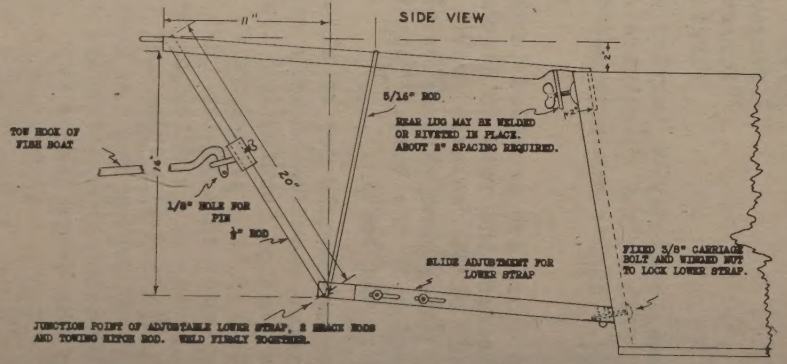
TOW HOOK OF FISH DISTRIBUTION BOAT AND TOWING HITCH ROD SHOULD BE OF $\frac{1}{2}$" DIAMETER STOCK. VERTICAL BRACE RODS SHOULD BE 5/16" MATERIAL. STRAPS, BOTTOM AND TOP, ARE OF 5/16" TO 1/4" x 1" STOCK.

WINGED NUTS, CLAMP BOLTS, AND SET SCREW SHOULD PROVIDE FOR QUICK ATTACHMENT, REMOVAL, AND/OR ADJUSTMENT.

SCALE 1" = 10"

Designed by ROY D. NOBLE
Drawn by CARNY H. BENNETT




11"
SIDE VIEW
2"
5/16" ROD
REAR LUG MAY BE WELDED OR RIVETED IN PLACE. ABOUT 2" SPACING REQUIRED.
TOW HOOK OF FISH BOAT
20°
1/8" HOLE FOR PIN
½" ROD
SLIDE ADJUSTMENT FOR LOWER STRAP
FIXED 5/8" CARRIAGE BOLT AND WINGED NUT TO LOCK LOWER STRAP.
JUNCTION POINT OF ADJUSTABLE LOWER STRAP, 2 BRACE RODS AND TOWING HITCH ROD. WELD FIRMLY TOGETHER.